Remarks

Claims 1-3 and 5-26 are pending in this application, of which claims 1-3 and 5-26 have been rejected. Applicant respectfully traverses these rejections, however by this paper, Applicant amends claims 1, 7, 10, and 13 and presents new claim 27 to further prosecution.

By this paper, claim 1 has been amended to more clearly and distinctly claim the invention. The vertical member as amended includes limitations disclosed in Figs. 4-9 and paragraphs [113], and [127]-[130]. The parallel flow distribution modules as amended include limitations disclosed in Figs. 4-9 and previously presented claim 7. The conductive surface as amended includes limitations of previously presented claim 10. And the target bars as amended include limitations disclosed in Figs. 7 and 9 and paragraphs [62], [67] and [127]-[130]. Applicant asserts that no new matter is added by this amendment.

Additionally, claim 7 has been amended by this paper to include limitations previously disclosed in the abstract.

Rejection of claims 1, 5, 10, 22 and 24
over Noakes in view of Wichmann, Meston and Daniel

Claims 1, 5, 10, 22 and 24 are rejected under 35 U.S.C. § 103(a) as being obvious over Noakes (US Patent No. 4,801,086), in view of Wichmann (US Patent No. 5,209,410), Meston (US Patent No. 2,097,233) and Daniel (US Patent No. 4,790,155). (Pages 3-7 of the Office Action of March 1, 2010).

Claim 1

Claim 1 as amended requires "target bars . . . defining one or more electrostatic fields". The Examiner relies on Wichman's inductor bars 42 for satisfying the target bars limitation. (Page 3 of the Office Action of March 1, 2010).

Wichmann teaches a "pair of inductor bars 42 [that] are illustrated as being spaced in substantially parallel relationship from the dispensing edge. . . of each nozzle 25 . . . to help direct or guide the electrostatically dispensed material in a desired direction." (Fig. 2, Wichmann, Col. 5, lines 45-53, emphasis added). Thus Wichmann's inductor bars 42 do not define an electrostatic field, rather they guide or intensify an existing field created between the nozzle 25 and the target. Wichmann does not teach target bars to define electrostatic fields and therefore claim 1 is nonobvious over the Examiner's combination.

Claim 1 as amended requires "target bars formed with a length oriented parallel to and spaced from the vertical member with the substrate conveyed therebetween". (Emphasis added). The Examiner relies on Wichman's inductor bars 42 for satisfying the target bars limitation, and Noakes plate 47 for satisfying the vertical member limitation. (Page 3 of the Office Action of March 1, 2010).

Wichmann teaches inductor bars 42 mounted adjacent to the nozzle 25. (Wichmann, Fig. 1). In Fig. 6, Wichmann illustrates an nozzle assembly152 having inductor bars for spraying a product "P" positioned below the assembly 152. Wichmann does not teach conveying the product "P" between the inductor bars 42 and the nozzle 25. Therefore Wichmann does not teach "target bars . . . spaced from the vertical member with the substrate conveyed therebetween", and therefore claim 1 is nonobvious over Wichmann.

As admitted by the Examiner, Noakes does not teach target bars that define electrostatic fields. (Page 3 of the Office Action of March 1, 2010). Noakes teaches spraying an article 16 that is offset from a spraying apparatus. (Noakes, Figs. 1 and 2). Noakes does not teach conveying the article 16 between a vertical member and a target bar.

Meston teaches the deposition of particles from a gaseous flow to a substrate (plate electrode 5). (Metson, Fig. 1). The particles pass through a chamber 1 where an electric field created by a series of electrodes 4 with the plate electrode 5 directs the particles to be "deposited on plate 5 in pattern form." (Metson, Page 2, Col. 1, lines 59 - Col. 2, line 5, Fig. 1).

With respect to Figures 14-16, Metson teaches a "[s]piral 60 [] made of a metal strip two inches wide with points 61". "This electrode was held over the plate electrode 5 in Figure 1" to create the pattern illustrated in Fig. 16. (Metson, Page 3, Col. 2, lines 60-70). The spiral 60 electrode of Metson functions similar to the inductor bars 42 of Wichmann, in that spiral 60 directs or guides charged particles/material as they pass by and are deposited on an article/electrode. Metson does not teach conveying a substrate between the high voltage electrodes 4 and the spiral 60. Daniel does not disclose spraying related to electric fields. Therefore Wichmann, Noakes, Metson and Daniel alone or in combination, do not teach or suggest "target bars . . . spaced from the vertical member with the substrate conveyed therebetween" as claimed. Therefore claim 1 is nonobvious over the Examiner's combination.

Claim 1 as amended also requires "each target bar is . . . formed with a height having high parts and low parts . . . to create distinctive electrical fields for providing continuous parallel spray of the substrate". (Emphasis added). The Examiner relies on Wichman's inductor bars 42 for satisfying the target bars limitation and Meston's disclosure at Col. 2, lines 4-14 for satisfying the high and low parts limitation. (Pages 3 and 4 of the Office Action of March 1, 2010).

Meston teaches the deposition of particles from a gaseous flow to a substrate (plate electrode 5). (Metson, Fig. 1). The particles pass through a chamber 1 where an electric field created by a series of electrodes 4 with the plate electrode 5 directs the particles to be "deposited on plate 5 in pattern form." (Metson, Page 2, Col. 1, lines 59 - Col. 2, line 5, Fig. 1). Metson teaches the deposition of particles in a pattern and therefore teaches away from electrostatic spray as taught by Noakes and Wichmann. Therefore claim 1 is nonobvious over the Examiner's combination.

Further, in Figures 20 and 21 Metson teaches an apparatus for commercializing the invention. Metson teaches "[t]he metal blanks upon which the patterns are to be deposited are brought into chamber 80 on conveyor 86 and held under discharge elements 90 as shown at 92 while the deposition is being made." After the deposition "a coated blank 92, after leaving chamber 80, is brought into the bottom of furnace 94 on conveyor 86 and is held in the position

shown at 92' while another blank 92 is being coated in chamber 80." Metson teaches intermittent deposition and heating in a furnace, and therefore teaches away from a continuous spray. Therefore claim 1 is nonobvious over the Examiner's combination.

Claims 5, 10, 22 and 24 depend from claim 1 and therefore are nonobvious for at least the reasons stated above with reference to claim 1.

Rejection of claims 16-18
over Noakes in view of Wichmann, Meston, Daniel and Seaver

Claims 16-18 are rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel and further in view of Seaver (US Patent No. 5,326,598). (Pages 6 and 7 of the Office Action of March 1, 2010). Claims 16-18 depend from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Seaver. Therefore claims 16-18 are nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Rejection of claims 2 and 3
over Noakes in view of Wichmann, Meston, Daniel and Maier

Claims 2 and 3 are rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel and further in view of Maier (US Patent No. 5,332,154). (Pages 7-8 of the Office Action of March 1, 2010). Claims 2 and 3 depend from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Maier. Therefore claims 2 and 3 are nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Rejection of claim 6

over Noakes in view of Wichmann, Meston, Daniel and Sugiyama

Claim 6 is rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel and further in view of Sugiyama (US Patent No. 5,803,371). (Pages 9 of the Office Action of March 1, 2010). Claim 6 depends from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Sugiyama. Therefore claim 6 is nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Further, the claimed electrostatic spray installation overcomes the problem of distributing flowable material and minimizing dripping. Such a problem is discussed in Applicant's description at pages 8 and 9 paragraphs [62] and [64]. The claimed invention overcomes these problems due to the features that are claimed. The features that provide distribution of flowable material and minimization of dripping include various features that the Examiner did not locate in the Noakes, Wichmann, Meston and Daniel patents. Accordingly, the Examiner further extended his search outside the art of electrostatic spray systems to find the claimed features that distinguish over Noakes and Wichmann.

Claim 6 requires "a distribution groove that is directly connected to each of a number of smaller parallel grooves aligned in the direction of the electrostatic field". As admitted by the Examiner, Noakes, Wichmann, Meston and Daniel do not disclose this claim element. (Page 9 of the Office Action of March 1, 2010). The smaller grooves aligned in the direction of the electrostatic field provide advantages over the prior art by distributing the flowable material while minimizing the volume of material to be sprayed which minimizes dripping. The prior art including Noakes and Wichmann, teach fluid reservoirs (gallery 8 and 9 of Noakes Fig. 2, and distribution chambers 76 of Whichman, Fig 4) for distributing flowable material, and gaps between plates (channels 4 and 6 of Noakes Fig. 2) which drain or "drip" after spraying.

The Examiner extended his search to include a nonanalogous art of blowing or spraying compressed air, solvents etc. and located the Sugiyama patent. The Examiner utilized

the Sugiyama reference because it includes an inlet passage 16 that is directly connected to grooves 17, Fig. 1. However, the Sugiyama patent does not address the problem that is addressed by the invention claimed in claim 6. More specifically, Sugiyama does not address distributing flow while minimizing drip. The problem addressed by Sugiyama is "producing a higher blow effect, a greater reduction of noise and a greater ease in cleaning the injection hole." (Sugiyama Col. 2, lines 8-13). Therefore, one having ordinary skill in the art of electrostatic spray would not have searched the nonanalogous art of air injection nozzles and located the Sugiyama patent because the Sugiyama patent does not address the problem (distributing flow while minimizing drip) that is solved by the a distribution groove that is directly connected to each of a number of smaller parallel grooves aligned in the direction of the electrostatic field of the electrostatic spray system in claim 6. Therefore, the combination of references is nonobvious.

Further, the Examiner's reasoning for combining these references is "to improve the injection speed of the apparatus of NOAKES in view of WICHMANN, MESTON and DANIEL". However, Applicant asserts that injection speed is not an issue in electrostatic spraying, in fact it should be as low as possible so that the spray is not affected by any appreciable kinetic effects. Therefore, the Examiner's reasoning does not support this combination and claim 6 is nonobvious over the Examiner's combination.

Rejection of claim 13

over Noakes in view of Wichmann, Meston, Daniel, Sugiyama and Maier

Claim 13 is rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel, Sugiyama and further in view of Maier. (Pages 9-10 of the Office Action of March 1, 2010). Claim 13 depends from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Sugiyama and Maier. Therefore claim 13 is nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Further, claim 13 as amended requires "the system is configured for downward spraying and . . . the location of the inlet of each distribution module below the feed line of the grooves that are aligned with the electrostatic field, ensuring the minimum of flowable material

to be available for dripping." The Examiner relies on the inlet passage 16 of Sugiyama for satisfying the inlet; the grooves 17 of Sugiyama for satisfying the grooves. (Pages 9-10 of the office action of March 1, 2010). The Examiner admits that Noakes, Wichmann, Meston, Daniel and Sugiyama do not "show that the inlet is located below the grooves." The Examiner relies on Maier's disclosure of upward spraying (at Col. 1, lines 25-31 and Fig. 9) for establishing a "prima facie" case of obviousness. (Page 10 of the office action of March 1, 2010).

Claim 13 has been amended to require downward spraying. As admitted by the Examiner, Noakes, Wichmann, Meston, Daniel and Sugiyama do not teach the limitations of previously presented claim 13, and that Maier teaches upward spraying. (Page 10 of the office action of March 1, 2010. The Examiner's combination does not teach or suggest "downward spraying and . . . the location of the inlet of each distribution module below the feed line of the grooves", as claimed. Therefore claim 13 is nonobvious over the combination.

Rejection of claims 7-9, 11 and 19
over Noakes in view of Wichmann, Meston, Daniel and Miller

Claims 7-9, 11 and 19 are rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, and Daniel and further in view of Miller (US Patent No. 2,695,002). (Pages 10-13 of the Office Action of March 1, 2010). Claims 7-9, 11 and 19 depend from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Miller. Therefore claims 7-9, 11 and 19 are nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Rejection of claim 12
over Noakes in view of Wichmann, Meston, Daniel, Miller and Ransburg

Claim 12 is rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel, Miller and further in view of Ransburg (US Patent No. 2,509,277). (Page 13 of the Office Action of March 1, 2010). Claim 12 depends from claim 11, which depends from claim 1. The novel and nonobvious features of claim 1 are not taught or

suggested by Miller and Ransburg. Therefore claim 12 is nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Claim 12 requires "a ground switch; wherein the drip proof stop of the spray is obtained by combining temporary suction of the flow to a flow distribution module with the quick removal of the high voltage from the charging strip by means of the ground switch." The Examiner relies on the combination of Noakes, Wichmann, Meston, Daniel and Miller for satisfying the limitation of claim 11, and the switch 35 of Ransburg for satisfying the limitations of the ground switch. (Page 13 of the office action of March 1, 2010). The Examiner states that "[o]ne of ordinary skill in the art at the time of the invention, needing to prevent sparking in the apparatus" of Noakes in view of Wichmann, Meston, Daniel and Miller would have found it obvious to incorporate the ground switch. (Page 13 of the Office Action of March 1, 2010).

Ransburg teaches a handheld spray gun 16 having an electrode 17 for spraying a grounded article 15. (Ransburg, Col. 2, lines 32-34, Fig. 1). Ransburg also teaches that sparking may occur if the distance between the electrode 17 is to close to the grounded article 15. (Ransburg, Col. 5, lines 5-10). Noakes teaches an electrospray system with fixed distances between electrodes. (Noakes, Figs 1 and 2). Additionally, in the embodiment of Figure 4, Noakes teaches an electrode 9 that is positioned 5-10 mm from the outlet edge 7. (Noakes, Col. 4, lines 49-50). Noakes discloses that "[e]ach element 9 has a core of conducting or semi-conducting material sheathed in a material of dielectric strength greater than 15 KV/mm" and "[t]his is sufficient to prevent sparking between the electrode elements and the sprayhead." (Noakes, Col. 4, lines 38-43). Noakes teaches fixed distances between electrodes and coating electrodes to prevent sparking and therefore teaches away from a ground switch. Noakes teaches away from the Examiner's combination and therefore claim 12 is nonobvious.

Rejection of claims 14 and 15
over Noakes in view of Wichmann, Meston, Daniel, Miller and Shvets and Hawkins

Claims 14 and 15 are rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel, Miller and further in view of Shvets (US Patent

Application Publication No. 2002/0168297) and Hawkins (US Patent No. 6,158,235). (Pages 14-15 of the Office Action of March 1, 2010). Claims 14 and 15 depend from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Miller and Shvets and Hawkins. Therefore claims 14 and 15 are nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Rejection of claim 20
over Noakes in view of Wichmann, Meston, Daniel and Miller '354

Claim 20 is rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel and further in view of Miller '354 (US Patent No. 5,516,354). (Pages 15-16 of the Office Action of March 1, 2010). Claim 20 depends from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Miller '354. Therefore claim 20 is nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Rejection of claim 21
over Noakes in view of Wichmann, Meston, Daniel, Miller '354 and Ransburg

Claim 21 is rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel, Miller '354 and further in view of Ransburg. (Page 16 of the Office Action of March 1, 2010). Claim 21 depends from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Miller '354 and Ransburg. Therefore claim 21 is nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Further, claim 21 requires "grounding switches are provided as a means to remove the high voltage quickly from the charged parts." The Examiner relies on the switch 35 of Ransburg for satisfying the limitations of the ground switch. (Page 16 of the office action of March 1, 2010). The Examiner states that "[o]ne of ordinary skill in the art at the time of the invention, needing to prevent sparking in the apparatus" Noakes in view of Wichmann, Meston, Daniel and Miller '354 would have found it obvious to incorporate the ground switch.

Ransburg teaches a handheld spray gun 16 having an electrode 17 for spraying a grounded article 15. (Ransburg, Col. 2, lines 32-34, Fig. 1). Ransburg also teaches that sparking may occur if the distance between the electrode 17 is to close to the grounded article 15. (Ransburg, Col. 5, lines 5-10). Noakes teaches an electrospray system with fixed distances between electrodes. (Noakes, Figs 1 and 2). Additionally, in the embodiment of Figure 4, Noakes teaches an electrode 9 that is positioned 5-10 mm from the outlet edge 7. (Noakes, Col. 4, lines 49-50). Noakes discloses that "[e]ach element 9 has a core of conducting or semi-conducting material sheathed in a material of dielectric strength greater than 15 KV/mm" and "[t]his is sufficient to prevent sparking between the electrode elements and the sprayhead." (Noakes, Col. 4, lines 38-43). Noakes teaches fixed distances between electrodes and coating electrodes to prevent sparking and therefore teaches away from a ground switch. Noakes teaches away from the Examiner's combination and therefore claim 21 is nonobvious.

Rejection of claim 23
over Noakes in view of Wichmann, Meston, Daniel and Olbrant

Claim 23 is rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel and further in view of Olbrant (US Patent No. 3,775,806). (Page 17 of the Office Action of March 1, 2010). Claim 23 depends from claim 1. The novel and nonobvious features of claim 1 are not taught or suggested by Olbrant. Therefore claim 23 is nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Rejection of claim 25
over Noakes in view of Wichmann, Meston, Daniel and Whitehouse

Claim 25 is rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Meston, Daniel and further in view of Whitehouse (US Patent No. 5,306,412). (Page 17-18 of the Office Action of March 1, 2010). Claim 25 depends from claim 1. The novel features of claim 1 are not taught or suggested by Whitehouse. Therefore claim 25 is nonobvious over the Examiner's combination for at least the reasons stated above for claim 1.

Rejection of claim 26

over Noakes in view of Wichmann, Daniel Sugiyama and Maier

Claim 26 is rejected under 35 U.S.C. § 103(a) as being obvious over Noakes in view of Wichmann, Daniel, Sugiyama and Maier. (Page 18-20 of the Office Action of March 1, 2010).

Claim 26 requires "target bars to define the electrostatic field". The Examiner relies on Wichman's inductor bars 42 for satisfying the target bars limitation. (Page 18 of the Office Action of March 1, 2010).

Wichmann teaches a "pair of inductor bars 42 [that] are illustrated as being spaced in substantially parallel relationship from the dispensing edge. . . of each nozzle 25 . . . to help direct or guide the electrostatically dispensed material in a desired direction." (Fig. 2, Wichmann, Col. 5, lines 45-53, emphasis added). Additionally, Wichmann teaches different procedures for stabilizing charges on the inductor bars 63 by charging them to an intermediate voltage, such as connecting the bars 63 to ground through a resistor or electrically charging the bars 63. (Wichmann, Col. 6, lines 22-45). However, either of these approaches would act to repel the flowable material by creating a charge on the inductor 63 with the same polarity as that of the material. Wichmann teaches inductor bars for directing flowable material in an existing electric field, and not "target bars to define one or more electrostatic fields" as claimed, therefore claim 26 is nonobvious over the Examiner's combination.

New Claim

New claim 27 is presented by this paper. Claim 27 includes the limitations of previously presented claim 1; vertical member limitations disclosed in Figs. 4-9 and paragraphs [113], and [127]-[130]; target bar limitations disclosed in Figs. 7 and 9 and paragraphs [62], [67] and [127]-[130]; along with sheets limitations disclosed in Figs. 4-6 and 9 and paragraph [113]. Applicant asserts that no new matter is added by this amendment.

Claim 27 as amended requires "the sheets extend beyond the flow distribution modules and the one or more vertical members for providing separate parallel sprays spaced 30 to 40 mm from each other". With respect to the Examiner's rejection of claim 1, the Examiner relies on Noakes' plates 45 and 49 for satisfying the flow distribution module limitation, plate 47 for satisfying the vertical member limitation, and Noakes' disclosure regarding Figure 9 at Col. 5, lines 41-50 for satisfying the providing parallel spray limitation. (Page 3 of the Office Action of March 1, 2010).

Noakes' teaches "[a]n apparatus and process for the electrostatic spraying of a mixture of a plurality of liquids". (Noakes, Abstract, emphasis added). Regarding Figure 8, Noakes teaches a "sprayhead in which channels 41 and 43 for liquids are defined by upstanding plates 45, 47 and 49 of insulating material . . . " with "an electrode 51 [] formed by a metal insert at a lower edge of the plate 47". (Noakes, Col. 5, lines 40-47). In the embodiment of Figure 9, Noakes teaches a sprayhead similar to that of Figure 8, with two electrodes 51 and 53 located within the fluid channels. In both embodiments (Fig. 8 and 9) Noakes teaches a central plate 47 that extends below the outer plates 45 and 49, such that fluids A and B flow through channels 41 and 43. (Figs. 8 and 9). Noakes discloses that "[e]ach of the apparatus described above can be used for mixing a variety of different liquids." (Noakes, Col. 7, lines 50-51, emphasis added). Noakes teaches a central plate that extends below outer plates to provide common spray. Therefore Noakes does not teach "sheets [that] extend beyond the flow distribution modules and the one or more vertical members for providing separate parallel sprays" as claimed, therefore claim 27 is novel and nonobvious over Noakes.

Wichmann teaches a nozzle 25 having a front member 70 and a rear member 90 with a shim 112 therebetween. (Wichmann Fig. 2 and Fig. 4). Flowable material enters Wichman's nozzle 25, and collects at a common dispensing "edge 29 defined by mating edges 73 and 93 as shown in FIG. 4" which exits the nozzle as a common spray. (Wichmann Col. 5, lines 47-48, and Col. 8, lines 60-64). Therefore Wichmann teaches common spray, and not "sheets [that] extend beyond the flow distribution modules and the one or more vertical members for providing separate parallel sprays" as claimed. Therefore claim 27 is novel and nonobvious over Wichmann.

Conclusion

In view of the foregoing, the Applicant respectfully asserts that the application is in condition for allowance, which allowance is hereby respectfully requested.

The Petition fee of $245 along with the additional claims filing fee of $26 is being charged to Deposit Account No. 02-3978 via electronic authorization submitted concurrently herewith. The Commissioner is hereby authorized to charge any additional fees or credit any overpayments as a result of the filing of this paper to Deposit Account No. 02-3978.

Respectfully submitted,

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